TO STONES AND BONES, ADD GENES AND ISOTOPES, LIFE HISTORIES AND LANDSCAPES: ACCUMULATING ISSUES FOR THE TEACHING OF PALAEOLITHIC ARCHAEOLOGY

Anthony Sinclair

School of Archaeology, Classics and Egyptology,
University of Liverpool,
Liverpool, L69 3GS, UK
Email: a.g.m.sinclair@liverpool.ac.uk

Abstract

The study of the Palaeolithic is not usually thought of as being as being at the forefront of theoretical, or practical developments, but in the last 30 years our theoretical understanding of the lives of ancient gatherers and hunters has been transformed through practical engagement with the material record, almost always undertaken through university- based, student-powered, field projects. This paper will look at three different forms of field project that have sought to integrate theoretical developments with practical fieldwork in Upper Palaeolithic archaeology: the economic landscape studies at Klithi in northern Greece, the delicate excavations at Pincevent and neighbouring Paris Basin sites, and landscape survey at Makapansgat in South Africa. In particular, I shall look at the disjunction between the timescales of field projects from inception through to write up and consider what problems might exist for students in attempting to learn within the normal time period that they spend on a site about the big questions of scale from the moment through to the passing of species, from the sitting of a group around a hearth to the movement of bands around a vast landscape, that so preoccupy Palaeolithic archaeologists.

Keywords
Grand Narrative; Palaeolithic archaeology; undergraduate; research skills

In 1973 David Clarke remarked that archaeology as a discipline had expanded its consciousness and lost its innocence. Archaeologists were no longer satisfied with simple explanations that identified groups of artefacts based on material similarity and interpreted these as the activities and developments of human cultural groups (Clarke 1973). Our eyes had been awakened by developments in science and theory that could both expand the information that might be made available to archaeologists from past materials, and yet at the same time remind us of the sampling process that lay behind the deposition, survival, recovery and analysis of the archaeological record and the inevitable loss of information. Whilst Clarke himself admitted that the New Archaeology, which had shattered our innocence, had left us more with a set of questions more than a set of answers (Clarke 1973), he retained a clear sense of optimism that with a more worldly-wise sense of what archaeologists as practitioners should understand, there lay a productive future ahead of us: the general theory of archaeology. Understanding archaeology was a matter of understanding the Russian Doll of samples that progressively thinned out the original body of material remains used by a society to the data set analysed by the archaeologist (Clarke 1973:16-17).

I first read Clarke's 'Loss of Innocence' paper as a somewhat naïve second year undergraduate specialising in the Palaeolithic. At that time I was exposed as a student to the Processual rigour of the archaeology of the Palaeolithic period on the one hand, and to the developing Post-processual ideas

of Ian Hodder on the other hand, explored in studies of later Prehistory and contemporary societies. Clarke's article engendered a sense of intellectual enthusiasm and hopefulness about the changes that were happening in archaeology. I thought myself lucky to be a student at such a time of intellectual change with the opportunities to develop a sound knowledge of the Palaeolithic archaeological record hand in hand with an understanding of the theoretical tensions that lay behind the Culture History approach, Processual Archaeology and the interpretive freedom opened up by their criticism by Post-processual thinkers. This sense of optimism continued until the completion of my PhD a few years later. Since beginning to teach students of my own, and most especially in the last couple of years when my teaching portfolio has returned to teaching groups of second and third year students about the archaeology of the Upper Palaeolithic period (from a previous portfolio that was more 'naturally' partitioned into issues), my confidence about what can be learned as an undergraduate student has diminished, and this leaves me frustrated.

Reading Clarke once more throws light upon why I was enthused by his work, and the problem that it raises for our teaching today. Archaeology's loss of innocence was not simply the product of the arrival of a general theory of archaeological reasoning and practical endeavour, it also came about through an understanding of the theoretical tensions between new methodologies, new observations and the theories of information, concepts and reasoning (Sinclair 1998). My own sense of optimism arose from feeling that I was beginning to understand this set of interwoven elements, and that it would be possible for me to develop my own approach as a practising Palaeolithic archaeologist that was different to what I was taught. For Clarke also, engaging with students, and the intellectual challenge – the awkward questions - they gave back to their teachers was key to the growth of archaeology, because:

> "The needs of teaching emerge as one of the main disciplinary propellants into the space of expanding consciousness – student and amateur provide the fuel, research sparks ignition and the disciplinary elders monitor and direct in a series of contradictory instructions" (Clarke 1973:7).

For Clarke, therefore, the development of archaeology would come about as much through the expanding consciousness of one's students as challenging learners ('archaeologists-to-be' perhaps?), as through the research endeavours of established practitioners. Essential to an expansion of consciousness was an understanding of the complex interplay that created archaeology as a form of practice, reasoning and knowledge. Clarke took it as read that students would understand this complex interplay to a sufficiently deep degree such that they could engage with their teachers in constructive discussions about how both general and particular problems might be investigated, and that this mutual activity of discussion and problem-solving was what characterised an effective learning environment.

When considered in this way, my frustration as a teacher arises from recognising that the creation and long-term maintenance of such a community of practice is not easy to bring about. This article is a reflection on the changes in teaching, but most especially in the nature of Palaeolithic archaeology as an academic practice, to explain this frustration and reflect on ways of countering it. I would like my students to be as enthused by Palaeolithic archaeology as I was as an undergraduate, but, in simple terms, I have real worries that the solution to this problem is not simply a development of teaching practice. We certainly need to recognise how institutional changes in teaching practices and the social context of learning has affected the manner in which teaching and learning takes place. However, we also need to consider how Palaeolithic archaeology (1) has developed as a mode of practice and the effect that this might have on the nature of what is now to be taught that makes it much more difficult to create a 'community of practice' at the deep level of understanding described by Clarke.

Skills and content: a selective dilemma

Commentaries on higher education have rightly emphasised those changes that have altered the context of teaching and learning; larger class sizes, external demands on student and staff time, and the modularisation of subjects are regularly cited (Beard & Hartley 1984; Ramsden 2003). There are also discussion of issues related to generic skills such as theories of teaching and student learning (Fox 1983; Heikkila & Lonka 2006; Hallden 1986). What is usually missing from these discussions is an exploration of the role of specific content in challenging teaching and learning (2). Higher education

teachers teach their subject and the nature of their subject affects the nature of the learning and teaching task. And whilst the impact of research assessments, such as the Research Assessment Exercise in the United Kingdom, is noted for the impact it has upon the time and importance that academics will give to their teaching versus their research, we also need an appreciation and exploration of how specific academic disciplines, such as archaeology, situate themselves within a higher education context and develop as disciplines in their own particular way. Each discipline combines a particular combination of analytical approaches (tied to shifting understandings of 'appropriate data'), has a particular rhythm and manner for publication, research and teaching. And these factors interact differently with the broader context of change in higher education to generate discipline and perhaps sub-disciplinary problems for learning and teaching.

Archaeology is a discipline tied into other disciplines and modes of enquiry that now impinge considerably more extensively upon our questions and subject matter than before. It is also a subject taught in higher education to students who for the most part have little idea of the nature of the discipline, or the methods by which it is studied. Furthermore, whilst many students will know a little about the classical or historical worlds which will provide some basic background knowledge for classical or historical archaeology, few if any will bring previous knowledge of the prehistoric world, let alone the deep time of the Palaeolithic. It is in this context that the successful teaching and learning of Palaeolithic archaeology in the Anglo-American tradition has become significantly more difficult with time (3).

Whilst Palaeolithic archaeology has remained largely a discipline devoted to a general understanding of past human species in their broader environmental context, its particular development has followed a course that has refined and introduced a considerable range of new concepts, new methodologies and new observations with which one must now be familiar. This development has made Palaeolithic archaeology an endlessly fascinating and challenging area of archaeological research with the opportunity to ask questions of the archaeological record that might never have been thought possible just a few years ago. It has also made it much more difficult for undergraduate students to engage critically and knowledgeably with the theory and primary archaeological data of the period and for teachers to select and emphasise 'essential concepts and knowledge' from the great range available.

In the sections that follow I shall set out some of the ways in which Palaeolithic archaeology has broadened as an academic study, and some of the resultant problems and tensions that I now think make it difficult to convey this breadth to students. Many of these observations are related to expansion of ways of interpreting the evidence of the past, and the sheer accumulation of evidence, would also hold true for the teaching of other periods of prehistory, though perhaps not in the same way. I shall stress the importance of research contexts, as well as the problems of timescales for learning that make integrating theory and practice in Palaeolithic teaching such a challenge. The observations that I make are of course personal: they come out of my own context of learning and teaching in the United Kingdom, a context in which the study of Palaeolithic archaeology is a generalising discipline seeking to explore 'grand narratives' and generalising concepts over time and space (Gamble 1986, 1999; Dennell 1983).

Standing in the background of any discussion of teaching and learning in archaeology is that, in the United Kingdom, archaeology is primarily a form of higher education. Most students will embark on their university studies without any formal education in the discipline of archaeology. By the end of their degree students are expected to have acquired a practical knowledge of the methods and concepts of the discipline and a knowledge of the significant 'events' or developments of any period that they may choose to study as well as the current critical research problems of this period. I take it as axiomatic that the learning and teaching of an historical discipline, such as archaeology, at the level of higher education has as its basic purpose the development of skills both to criticise and synthesise primary data and theory, and to communicate the results of this dialogue. For archaeology, these skills may be largely general skills, but they are learned through the specific. Without an engagement with the primary materials and concepts, the learning of archaeology can be little more than an extended memory test relying upon the structures and critical comments of others without having to develop the same skills for oneself.

It is in this critical process of getting to know and understand the primary data that the most significant problem lies for an historical discipline like archaeology. Both the knowledge and the concepts that form the primary evidence seem to accumulate endlessly; yet the opportunity and the time with which

to learn this evidence within the higher education context does not. For the teacher, a process of selection, of leaving out is important; but how much can be left out without jeopardising a real understanding of what remains? And since the undergraduates of today are the researchers of tomorrow, to what extent will our selections narrow or diminish their research potential for the future?

The Accumulation of Knowledge

It is not only in terms of time that the study of the Palaeolithic sits at one end of archaeology; the particular combination of extreme time depth and the associated changes of climate, physical geography and species (plant, animal and human) that have occurred within this time frame means that much for what counts as Palaeolithic archaeology is a form of evolutionary biology than social science. In this context, Palaeolithic archaeology has witnessed not so much a transformation of thinking – as might be argued for aspects of later prehistory (Thomas 1991) – but a dramatic process of accumulation of new and ever more detailed ways of describing and structuring the evidence of the archaeological record of the Palaeolithic.

As a first example of accumulation, we might consider the knowledge and know-how –themes of analysis, key concepts (including their associated methods of analysis), and dependent conceptual knowledge that facilitates the collection of, and enable the interpretation of primary data, that characterises the practice of Palaeolithic archaeology; these have developed considerably in their scope and their complexity over the last 20 years (Tables 1 and 2). This accumulation of new concepts has led to an expansion of our ways of looking at both the traditional concerns of the Palaeolithic archaeologist (lithic technology, faunal remains, dating and climate change) as well as completely new fields of enquiry and their associated concepts (evolutionary psychology, genetic analysis).

For example, the core knowledge of an undergraduate student studying the Palaeolithic 20 years ago would have included the following: an understanding of the mechanics of lithic technology and retouched tool classification (with a view to understanding the basic changes in technology from core to blade technologies), the composition of stone tool assemblages from different periods and different 'cultural groups', some knowledge of the methodology of use-wear analysis and its results, some knowledge of the basic subsistence and social structures of hunter-gatherer societies, some knowledge of faunal analysis, some knowledge of climate change and the basic sources of palaeoclimatic interpretation. A student today should ideally also understand the concept of the chaîne opératoire, and the distinction between 'know-how' – a practical knowledge rooted in the cumulative experience of the body, and 'knowledge' – the discursive knowledge of recipes for technological action (Schlanger 2004), and ideally be able to integrate this knowledge into broader discussions of personal identity and material expression (Dobres 1995, 2000; Sinclair 2000). In the understanding of faunal assemblages, a student should also now understand human diet in terms of diet breadth, patch time, the effects of transportation on bone assemblages, etc (Mithen 1990; Grayson & Delpeche 1998; Grayson 1989). In addition, an understanding of the use and limitations of stable isotopes to infer diet is currently highly beneficial (Richards et al. 2001; Drucker & Bocherens 2004), and will soon will be essential. For understanding the climate of the Pleistocene, it used to be enough to recognise climatic fluctuation in terms of glacial and interglacial cycles, the oxygen isotope stages (OIS) with intermediate fluctuations in terms of interstadials, and some understanding of the nature of vegetational character and change. Recent observations from the Greenland ice cores have fleshed out the detail of this scheme to include Greenland core based interstadials (GIS) in addition to the marine core based variations (MOIS), and also fundamentally changed our understanding of the timing and scale of environmental change. So for example to the once steady procession of glacial and interglacial cycles, must now be added the highly significant minutiae of Dansgaard-Oeschler fluctuations and Heinrich events that vary on a time scale that may have made them recognisable even to contemporary human societies (van Andel 2003; Barron et al. 2003). The simple schemes of vegetational recession and subsequent recolonisation are now known to be much more complex both temporally and spatially with a need for students to break out of a simple understanding of basic vegetational types such as taiga, steppe and tundra to recognise that there may have been associations of plant and animal species that both have no modern analogues, and were perhaps also specific to small regions and time periods (Huntley & Allen 2003). Finally, in a traditional archaeological area such as dating, modern students should be now be aware of thermoluminescence dating, optically-stimulated luminescence dating, palaeomagnetic dating, as well

as recent developments in developing a calibration curve for radiocarbon dating back to approximately 50,000 years before present (Bronk-Ramsay et al. 2006), and concerns about the reliability of age estimates from radiocarbon dates (Pettitt et al. 2003).

Whilst those developments listed above can be said to extend previous knowledge and concepts, an empowered student in 2007 would ideally also have a working knowledge of, and an appreciation for, a range of other concepts and methodologies that have impacted upon the study of the distant human past more recently, and significantly expanded the nature of Palaeolithic archaeology. For example, she would now need to have some knowledge of evolutionary psychology (Dunbar 1996), the concept of mind and mental modularity (Mithen 1996); and since 1987, they would also need to understand the concepts and ideally the methods of genetic seriation, with particular reference to Mitochondria and other forms of DNA, and Y-chromosomes, and their application to extensive DNA studies from modern populations (Pereira et al. 2005; Forster 2004), as well as an increasing number of studies of ancient DNA (Krings et al. 1997). For the study of hominid fossil populations, the number of species now recognised has increased enormously, and whilst there was some awareness of the contemporaneity of different species twenty years ago, with the exception of the last twenty-five thousand years, we should now assume a complex mixture of contemporary hominid species and populations, and investigate their biological and behavioural interrelationships if possible. At the level of the individual and of the individual species, new studies have introduced concepts of trauma and life history cycles (including both the mortality rates and maturation rates) for specific hominin species (Trinkaus 1995), recognising that population age profiles and the rate of maturation of hominins will have affected the nature of human society greatly. This list also currently ignores a knowledge of the historical development of archaeology, and of Palaeolithic archaeology in particular. It is important to stress clearly that as a teacher of Palaeolithic archaeology I am not expecting my students to be experts in these other areas of analysis, but I do hope that they should understand the basic strengths and weaknesses of such approaches to the evidence (ideally with key examples to illustrate), and the appropriateness of their findings to problems of understanding human development during the time period of the Palaeolithic.

Whilst concepts frame our way of making sense of the archaeological record, there is still the matter of learning the primary data of the archaeological record itself. For the learning and teaching of the Palaeolithic in Europe this would usually include the classic areas of East Africa, Western and Eastern Europe and Russia. In recent years, the end of the Cold War has brought about greater co-operation between archaeologists from either side of the once Iron Curtain resulting in a considerable increase in fieldwork and publication of previous work in English. In addition to this traditional stomping ground for Palaeolithic archaeology can we overlook the abundance of excellent primary data in North America, Southern Africa, Australia and Japan? And new fieldwork is revealing yet more information from East Asia, Central and South America and so forth.

Learning Resources

The other key aspect to the way in which an academic discipline develops is in the learning resources that it offers to students. Two primary forms of learning resources can be considered: published sources, and teachers themselves. Forms and extent of access to both have changed markedly in the last 20 years. There has been a movement away from the publication of syntheses towards that of journal articles such that it is increasingly difficult for teachers, let alone an enthusiastic student, to keep on top of the bigger picture. Whilst the loss of time spent with tutors has removed yet another valuable mechanism for appreciating the bigger context of a subject, and for growing into the position of practising members of an archaeological community.

Whilst there are some good syntheses, the breadth, speed and nature of current academic publication has meant that students need to go to the primary journals if they are to keep up to date with both data and issues. And whilst English has effectively become the primary language of communication for Palaeolithic scholars, there is still a considerable volume of essential primary publication in French, Spanish, German and other languages, in the form of syntheses and especially journal articles.

As a simple introduction to these problems, let us consider the publication of academic research on the Upper Palaeolithic archaeology of Europe, a period that spans in round numbers approximately forty thousand years from 50,000 years to 10,000 years before present. For those not familiar with

this period, it is a time that sees the arrival of modern humans into Europe, the appearance of the first representational art, evidence for what some scholars believe to be the first specialised subsistence economies, and a dramatic growth in evidence for regional- scale movement and personal social communication. This period also sees the extinction of the Neanderthals, likely contractions and expansions of modern populations, and last but not least the last glacial episodes and the attendant associated changes in European floral and faunal communities. It is a period that is (and has been) included in most undergraduate curricula since it provides an ideal 'issue-based' framework with which students can be engaged in discussion about the nature of modern humanity.

In terms of synthesis, students are reasonably well-served by some excellent publications for learning key methodologies for interpreting the archaeological materials of the period: for example, faunal analysis (Grayson 1996, Klein & Cruz- Uribe 1984), lithic analysis (Andrefsky 2001; Inizian *et al.* 1988). There are also excellent syntheses for the study of palaeoclimatology reconstructing quaternary environments, and understanding glacial landforms (Bradley 1999; Lowe & Walker 1997).

Synthethic monographs of the archaeological evidence, however, are less common. I have a small number of reasonably recent volumes on my book shelves that cover aspects of, or the whole of the Upper Palaeolithic of Europe at a level I would consider appropriate for a second or third year undergraduate student (Gamble 1986; Bahn & Vertut 1988; Bosinski 1990; Gamble 1999; Klein 1999; Soffer & Gamble 1989; Straus 1992; Svoboda, Lozek & Vlcek 1996; White 2003), as well as a couple that I would consider good introductions for a first year student (Gowlett 1992; Scarre 2005). Of these volumes, a number are classic syntheses with an attempt to progress through the whole of Europe by cultural chronology (Otte 1999) or the whole of Europe by region and period (Gamble 1986) or a much more limited region (Soffer 1985; Straus 1992; Svoboda *et al.* 1996). Finally, it is interesting to note that the most recent synthethic monographs either explore themes (White 2003) or present a particular approach to the nature of human social change and then explore this through selected examples (Gamble 1999).The small number of synthethic monographs means that it is essential for students to read publications in academic journals to engage with the most recent short synthetic articles (for example: The Upper Palaeolithic of Cantabrian Spain (Straus 2005; Straus *et al.* 2002; Trinkaus 2005), and of course the primary data and analyses.

Between 1985 and 2006, both the number of journals and the number of issues published has increased dramatically to cater for the pressures of the accountability (to both funding and personal promotion bodies) of academic research by publication (Table 3). As an undergraduate student in 1985, I could be reasonably well-read if I managed to keep an eye on the output of approximately ten to fifteen academic journals, each of which might have published between 4 and 6 issues per year. In 2006, as a teacher I could ask my students to look at primary publications in as many as forty journals; and each of these journals might appear at least 6 times *per annum,* with many now published monthly (4). Whilst internet-based, academic search engines (such as the 'Web of Knowledge' or, perhaps, Google Scholar) coupled with the development of electronic versions of journals may now help considerably both our knowledge of, as well as our physical access to, these resources (and perhaps also, like a double-edged sword, the expectation that publications in less-frequently cited journals should now be found and read), there can be little doubt that 'browsing the journals' has become a thing of the past for archaeological students (5). Finally, whilst I might hope that my students would appreciate the need to read publications not in English, and some certainly do, unfortunately the vast majority simply no longer possess the language skills to do so.

In addition to syntheses and journals, there are of course site monographs, the publications of PhDs, and conference publications (sometimes devoted to a period, and at other times devoted to a theme) and edited volumes of papers. A small and selective example might include the following publications: site monographs - (Pigeot 2004, 1987); published PhDs (Boyle 1990; Gordon 1988; Burke 1995; Pike-Tay 1991); conference proceedings (Bar-Yosef & Zilhao 2002; Soffer 1987; Soffer & Gamble 1989; Soffer and Praslov 1993); edited volumes (Conkey *et al.* 1997). For site monographs and some edited books, the need to read more than English remains as great as it ever was.

Theme of Analysis	Concepts	Dependent Conceptual Knowledge
Technology	Classification	*Retouched tool typologies Palaeolithic „Cultures "*
	Manufacture	*Lithic mechanics Flake to Prepared-flake to Blade*
	Tool function	*Use-wear studies*
Diet & Subsistence	Subsistence economy Hunter-gathering subsistence	*Species identification*
		Element identification
		Number of Individual Specimens
		Minimum Number of Individuals
Chronology	Association	*Stratigraphy*
	Dating	*Indirect dating techniques Absolute dating techniques Radioactive half-lives Radiocarbon years (compared to calendar years)*
Hominid Anatomy	Adaptation	*Climatic adaptation Functional adaptation*
	Locomotion	*Forms of locomotion / brachiation*
Species Change	Evolution	*Species change „Australopithecine to Homo "*
Palaeoenvironments	Characterisation	*Basic environmental types Taiga, Steppe, etc. Floral and faunal associations*
	Climate change	*Glacial / interglacial cycles Stadials & Interstadials* *Oxygen Isotopes and sea / snow levels*
Lifestyle / Society	Band Societies	*Egalitarianism Aggregation - Dispersion Foraging - Collecting*
	Site Function	*Habitation (domestic) Special purpose sites*

Table 1 Core Knowledge for Palaeolithic Archaeology – 1985

Theme of Analysis	Concepts	Dependent Conceptual Knowledge
Technology	Classification	*Retouched tool typologies Palaeolithic „Cultures "*
	Manufacture	*Lithic mechanics* *Flake to Prepared-flake to Blade*
	Socialised manufacture	*Chaîne-Opératoire* *„Savoir-Faire "– concrete knowledge* *„Connaisance "– „know-how "* skill/competence in manufacture
	Tool function	*Use-wear studies*
Diet & Subsistence	Subsistence economy Hunter-gathering subsistence	*Species identification Element identification Element analysis* *Number of Individual* Specimens Minimum Number of *Individuals Diet Breadth* Species evenness
	Diet and Dietary Change	*Skeletal chemistry* Stable isotopes Isotopic signatures Recognition of isotopic signatures
Chronology	Association	*Stratigraphy*
	Dating	*Indirect dating techniques Absolute dating techniques* *Radioactive half-lives* *Radiocarbon years (compared to calendar years)* Radiocarbon calibration Reliability of dates
Hominid Lives	Adaptation	*Climatic adaptation Functional adaptation*
	Locomotion	*Forms of locomotion / brachiation*
	Trauma	*Forms of skeletal trauma*
	Life-History	*Rates of maturation*
		Mortality rate and form
Species Change	Evolution	*Species change* „Australopithecine to Homo" *Interspecies competition DNA seriation* MtDNA, Nuclear, Y Chromosome
Palaeo-environments	Characterisation	*Basic environmental types* Taiga, Steppe, etc. *Non-analogue environmments Floral and faunal associations*
	Climate change	*Glacial Climates* *Glacial / interglacial cycles* Stadials & Interstadials *Oxygen Isotopes and sea / snow levels Events – Dansgard-Oeschler, Heinrich*
Lifestyle / Society	Band Societies	*Egalitarianism Aggregation - Dispersion Foraging - Collecting*
	Site Function	*Habitation (domestic) Special purpose sites*
	Social Relations	*Gender and age based social relations Material culture and identity*
	Social Stratification	*Horizontal and vertical ranking*
	Population movement	*DNA variation and seriation*
Hominid Cognition	Cognitive Evolution	*Forms of intelligence* Modular Generalised *Models of Intelligence* Piagetian models Memory models
	Social Brain	*Brain characteristics and social group size*

Table 2 Core Knowledge for Palaeolithic Archaeology – 2007

1985		2006	
Journal Title	**Issues per annum**	**Journal Title**	**Issues per annum**
L "Anthropologie	4	*L "Anthropologie*	5
Antiquity	4	Antiquity	4
American Anthropologist	4	American Anthropologist	4
American Antiquity	4	American Antiquity	4
Annual Review of Anthropology	1	American Journal of Human Genetics	6
Archaeometry	2	Annual Review of Anthropology	1
Bulletin de la Société Préhistorique Française	8	Archaeometry	4
Current Anthropology	5	Before Farming	4
Gallia Préhistoire	2	Behavioural and Brain Sciences	6
Journal of Anthropological Archaeology	3	*Bulletin de la Société Préhistorique Française*	8
Journal of Anthropological Research	4	Cambridge Archaeological Journal	3
Journal of Archaeological Science	6	Current Anthropology	6
Journal of Human Evolution	6	Evolutionary Anthropology	6
Man	4	*Gallia Préhistoire*	1
Proceedings of the Prehistoric Society	1	Geoarchaeology	5
Quaternary Research	3	International Journal of Osteoarchaeology	6
Quaternary Science Reviews	4	Journal of Anthropological Archaeology	4
Science	50	Journal of Anthropological Research	4
Trabajos de Prehistoria	2	Journal of Archaeological Science	12
World Archaeology	3	Journal of Human Evolution	12
		Journal of Molecular Evolution	12
		Journal of the Royal Anthropological Institute	5
		Journal of World Prehistory	4
		Nature	51
		PLOS Biology	12
		Proceedings of the Prehistoric Society	1
		Quaternary Research	3
		Quaternary Science Reviews	24
		Rock Art Research	2
		Science	50
		Trabajos de Prehistoria	2
		World Archaeology	4
Totals	**121**		**278**

Table 3 Principal venues for peer-reviewed publication of Upper Palaeolithic research.

The other key learning resources available to students are their teachers. The contexts in which students can make use of their teachers have changed in significant ways. Many commentaries on higher education will note that contact time between teachers and students has decreased, and this is no different for archaeology students. But a bigger change, not noted, relates to potential contact time off campus. As an undergraduate I spent much of my summer vacation participating in excavation and research projects directed by my own teachers and those in other universities in the UK and abroad. By the end of the summer after graduation I had accumulated 6 months full time experience of work on archaeological sites,. The length of time that I spent was not exceptional in comparison with my contemporaries; a number had more experience. In 2007, my students will often graduate with just 4 weeks experience (and sometimes less) in total on a project. The projects on which to gain experience are fewer – certainly with respect to the number of students – and students now have commitments to seeking paid work to help pay for their studies.

These long periods of 'extra' time that I spent excavating or surveying gave me a whole range of opportunities to 'learn' my subject. At a simple level, long periods of time on excavations gave me

great thinking time; the opportunity to reflect upon what I had learned in the previous year(s), to practice methodologies and to appreciate problems and variability in the archaeological evidence in real research contexts. For example, on one project I was able to observe at first hand the respective merits of typological analysis versus use-wear and technological approaches to lithic assemblages and the different sampling strategies and information that would result from such different ways of looking at the same evidence. On another, it was the value of three-dimensional recording of evidence, and on another, I learned about the tension between the desire for detailed spatial analysis, the time demands of three-dimensional recording, and the need to excavate a sufficient quantity of material for meaningful analysis, and growing out of these tensions, the ramifications associated with changing methodologies to deal with such tensions. Successful fieldwork is responsive to a site's potential – good or poor – and methods employed and research questions asked change appropriately. Time spent on archaeological project(s) is needed to become aware of this responsiveness, whilst such awareness can be essential to an informed reading of primary sources.

Just as importantly as the time available to understand the project, was the opportunity to spend time with, talk to, and to get to know one's own teachers and other academics, in a context that is very different from the formal tutorial or seminar that takes place within university buildings. Much of my own understanding of the broader context of Palaeolithic archaeology came from such conversations on excavations over meals or around the camp fire when I learned about the intellectual journeys of my teachers from undergraduate to research student and on to the direction of research projects, the problems and approaches they inherited from their teachers and the ways they reacted to and developed their inheritance in research projects of their own. It provided a broad and human context in which to translate one's knowledge of the historical development of Palaeolithic archaeology into an understanding of activity and change during the period. This is the broader context of knowledge creation and management that is only sometimes written about (yet which is essential to making sense of many primary sources (6)).

Another way to look at the time I spent on archaeological projects is as a form of apprenticeship into a community of practising archaeologists. Recent studies of pedagogy in higher education have indicated that not only is the best education achieved through learning in an active and supportive environment as might be the case, for example, with problem-based learning in real-world contexts (Harland 2003), but that learning in its ideal form might be best seen as the activity of a 'community of practise', in the sense set out by Lave and Wenger (Lave & Wenger 1991, Wenger 1998), in which an individual learns through active participation and through engagement in problem solving and knowledge creation equally from both a 'master' and from the 'journeymen' (to continue with the language of apprenticeship - those individuals who have not yet finished learning themselves and span the higher levels above the student). In turn, the student herself assists in the learning of her peers and her juniors. The excavation projects that I took part in were my apprenticeship into the community of practising Palaeolithic archaeologists, although I am reasonably sure that, with one possible exception, they were not designed with the aim of creating such a community as their primary purpose. This is, however, they worked, and in fact the social ties and commitments I made then still bind me in my work today. In consequence, when I have myself conducted research in the field, this creation of a community of people engaged at all levels in learning is one that I have tried to follow, although I am sure that I would have described these projects as 'like the ones I took part in as a student' rather than with the language of a community of practice. I know that colleagues have done the same. It has had success both in leading some on to further research degrees, and later, academic positions.

I should note that the developments described above are not new to Palaeolithic archaeology (or archaeology in general) since 1985. There has been an interdisciplinary side to our discipline since at least the 1950s and the development of Grahame Clarke's 'economic archaeology' (Clark 1952); and since the 1960s, at least, communities of practice in Palaeolithic archaeology have included practitioners from disciplines besides archaeology for the analysis of faunal remains, sediments and dating samples, and the statistical analysis of data. But it is worth noting, however, that whilst the good undergraduate of the mid 1980s might not have been expected to be an expert in these allied disciplines, she was expected to understand what they were trying to do, and the strengths and weaknesses of these other disciplinary approaches when applied to archaeological data (see, for example, discussions in Moore & Keene 1983). The difference now as I see it is the increased rate of appropriation of new disciplinary approaches outlined above, the considerable build up of quantities of

data related to environmental history, and, finally, the changed learning environment in higher education in the current Anglo-American academic context that encourages frequent journal contributions and frequently published debate in journals as the primary evidence to feed the process of research accountability and professional progress (a process in which textbooks and synthetic texts are not necessarily regarded as good evidence of international research standing). The problems of teaching and learning archaeology in the twenty-first century are considerably greater, and makes me wonder whether we have we reached a state that we shall pass through with new methods / understandings of teaching or a dead end for the undergraduate degree aimed at a synthetic understanding of Palaeolithic archaeology brought about by information overload?

Threshold or Abyss?

When David Clarke described the theoretical challenges of the New Archaeology of the 1960s and 1970s, as a consciousness-liberating, loss of innocence in which the demands of teaching upon both students and teachers could push forward the developments of archaeology, he was writing at a time when a number of archaeologists considered archaeology to be an essentially scientific discipline developing in similar ways to those described in 1970 by Thomas Kuhn in his classic *"The Structure of Scientific Revolutions"* (Kuhn 1970). Kuhn described a disciplinary world in which scientific disciplines and their communities were usually characterised by predominant modes of enquiry and understanding (paradigms). These modes of enquiry remained constant for some years, but might then be rapidly and radically changed - hence his use of the term revolution – though the interaction of new observations, theories and new scholars; after which the process would begin again.

In Kuhn's disciplinary world, students and teachers were engaged in the mutual building and testing of models of the world, the paradigms of understanding that comprised the major ways of bringing ideas and evidence together in any discipline. In the 1970s, when some archaeologists turned to Kuhn to provide a paradigm for how archaeology had changed (Fritz & Plog 1970), the overt comparison they drew between Kuhn's conception of disciplinary change and theoretical developments in archaeology served to give credence to the revolutionary impact of new Archaeological thinking upon the concepts that had previously characterised archaeology. In making this argument, though, they also effectively characterised archaeology as a discipline largely scientific in nature – a discipline concerned with understanding how human societies worked from a temporal perspective.

Such a vision of archaeology as a science of human and social nature takes not enough notice of the endless accumulation of evidence in archaeology, and of the need for chronicle through time and space that characterises much of the explanatory 'work' of a discipline that is more historical than experimental (7). It also misses the nature of a discipline in which the collection of new primary data is highly valued, as well as the maintenance of knowledge of primary data collected long ago.

Of course, this problem of the endless accumulation of data is not unique to archaeology: it is a feature of all historical disciplines. In archaeology this is compounded by the constant appropriation of new forms of data and analysis (such as ancient DNA) that we add into the mixture for our explanatory recipes. This incorporation of new themes for the analysis of traditional archaeological materials, the steady incorporation of new types of analysis of materials that are new to archaeology, and the extension of already established geographical areas of archaeological enquiry challenge the activity of learning and teaching to an extraordinary degree. They test not only the memory, they also demand that teachers and students can communicate and understand fundamentally new modes of enquiry and analysis many of which they must learn from the beginning in higher education.

I would not claim at this point to have the answer to this situation. The changes that I have seen have taken place at a number of levels and an effective response will be needed at these levels: the ways in which we can bring students into active participation within our research communities, our 'packaging' of essential skills and knowledge, both in timetabling and modular forms(8) and perhaps a questioning as to whether the synthetic tradition of Anglo-American archaeology is the desired-for end product or perhaps a hang-over from earlier, more imperial times.

At first sight, a simple means of tackling the accumulation of data might be to pare down our areas of geographical interest and become more locally focussed. We could move away from the Anglo-American tradition of grand or world synthesis towards a more Europe-centred perspective, as is the

case in teaching archaeology in other European countries (see endnote 3). In some respects this is already the case; teaching of the earliest Palaeolithic archaeology (from approximately 2.5 million to 1 million years ago) invariably includes the archaeological record of Africa, Europe and Asia as key data sets, and as we come forwards in time, so the focus has usually moved more towards Europe, in its widest geographical sense (including western Siberia). We could, however, be more radical still. Do students really need to know about the Palaeolithic archaeology of the Americas? What about South and South-East Asia, Australasia, Siberia and even Eastern Europe? Leaving these areas out would certainly trim the data set, but might well lose the broad overview approach that characterises the Palaeolithic perspective on world history (see, for example, Gamble 1993).

A second route, perhaps, is to step back from our module-centred approach to teaching, to consider the whole from a curricular perspective. In my own institution, individuals have become responsible for modules related to their own period or analytical interests or methodological skills. Degree curricula then come together as combinations of appropriate modules, and whilst there will be discussion and some co-ordination between teachers what is lacking is the starting point of an understanding of the finished 'scholar', of the Palaeolithic or prehistory and so forth. It is the module then as the basic block that is most closely designed and scrutinised. But standing back, we might focus more clearly on the necessary knowledge and understanding that needs to be acquired (9). We might then identify which concepts standout as 'threshold concepts' (in the sense indicated by Meyer and Land (2003, 2005) in which the learning of a threshold concept such as modularity of mind, perhaps, would radically alter the perspective that a student brings to their future understanding of human change. In this way not only might we have a clearer idea ourselves as to what is required, but so too would students, and they would also understand where they are in this journey of learning, and also where their peers are as people who might assist them in their learning, and in so doing begin to generate communities of practice beyond the boundaries of discrete archaeological field projects.

Acknowledgements

I thank Alan Booth, a former colleague at the Subject Centre for History, Classics and Archaeology for advice on the publication of commentaries on the problems of accumulating content in the teaching of history in higher education, and the comments of an anonymous reviewer to the first draft of this paper.

Endnotes

1
Whilst I shall concentrate on Palaeolithic archaeology in this article, I recognise that many of the same dilemmas also exist for teaching and learning the archaeology of other periods, although, if pressed, I would probably argue that these dilemmas are significantly greater for teaching periods rather than methods.

2
For a rare exception see the discussion of the manner and problems of teaching the American History Survey Course to first year students in the United States (Kornblith and Lasser 2001), in which the issues of chronology and theme, size, form and content of reading lists is insightfully discussed.

3
This paper concentrates on the learning and teaching of Palaeolithic archaeology in the Anglo-American tradition, and recognises that others may try to teach as Palaeolithic archaeology in quite a different way. I was made aware of this particular disciplinary (national?) manner of approach by a comment offered by a European archaeological colleague. At the original session of the annual conference of the European Association of Archaeologists at Krakow, when many of the papers in this volume were presented, an attendee from Denmark noted that outside of the Anglo-American archaeological community, archaeologists in Europe did not seek to create grand syntheses of the archaeological past but concentrated on the record of (their) local areas, and as a result some of our concerns about the teaching of grand synthesis were local- and not discipline-wide problems.

4
It is interesting to note that it is the journals (publishers?) that cater to Anglo-American academia that have seen this doubling of publication output; journals based in France or Spain, for instance, publish the same number of issues in 2006 as they did in 1985.

5
Confirmed by an unsystematic survey of 10 students in one class who, to a series of questions about how they engaged with journals, returned consistently the same answer: they did not browse through journals, but rather sought specific articles as set out on a reading list. Their favourite manner of doing so was primarily through an electronic connection.

6
By their very nature primary published articles in peer-reviewed journals are not candid, self-reflective

publications that admit to the responsiveness of most archaeological research.

7

This is beautifully illustrated by a comparison of Gordon Childe's own assessment of his life's contribution to archaeology (Childe 1958) and the external perspective offered of Childe's achievements by Stuart Piggott (1958). Childe emphasises his attempts to understand human society and the creation of knowledge, whilst Piggott stressed Childe's role in creating the time-space framework – the map of archaeological cultures – that made sense of the local archaeological material record.

8

Some structural aspects of teaching have already changed for the better. It is no longer necessary to assume that an undergraduate degree should equip a student with all the necessary knowledge and skills with which to start a PhD. There is some more time for reflection during a Masters qualification, as well as further opportunity to develop a community of practice that works so well in the field-based setting. Though it needs to be remembered that this necessary Masters stage was introduced with the aim of developing specific knowledge and analytical skills in preparation for future research rather than facilitating extra time for study.

9

The current benchmark for archaeology, whilst admirable in setting out thinking and practical skills that students should acquire through the course of an undergraduate degree, does not help here since the benchmarks specifically focus on skills not 'content'.

References

Bahn, P. G. & J. Vertut. 1988. Images of the Ice Age. London: Windward.

Barron, E., T. van Andel & D. Pollard. 2003. Glacial Environments II: Reconstructing the Climate of Europe in the Last Glaciation. In, T. van Andel & W. Davies (eds), Neanderthals and modern humans in Europe during the last glaciation. Cambridge: McDonald Institute Monographs.

Beard, R. & J. Hartley. 1984. Teaching and Learning in Higher Education. London: Paul Chapman Publishing Ltd.

Bosinski, G. 1990. Homo Sapiens: L'Histoire des Chassuers du Paleolithique Superieur en Europe (40,000 - 10,000 av. J.-C.). Paris: Editions Errance.

Boyle, K..V. 1990. Upper Palaeolithic Faunas of South-West France: a Zoogeographical Perspective. Vol. IS 557. Oxford: British Archaeological Reports.

Bradley, R..S. 1999. Palaeoclimatology: Reconstructing Climates of the Quaternary. San Diego: Academic Press.

Burke, A. M. 1995. Prey Movements and Settlement Patterns during the Upper Palaeolithic in Southwestern France. Oxford: British Archaeological Reports, International Series, 619.

Childe, V. G. 1958. Retrospect. Antiquity 32:69-74.

Clarke, D. L. 1973. Archaeology and the Loss of Innocence. Antiquity 47:6-18.

Clark, J. G. D. 1952. Prehistoric Europe: the Economic Basis. Cambridge: Cambridge University Press.

Conkey, M. W., O. Soffer, D. Stratmann, & N. G. Jablonski (eds). 1997. Beyond Art: Pleistocene Image and Symbol. San Francisco: University of California Press.

Dennell, R. 1983. European Economic Prehistory: a New Approach. London: Academic Press.

Dobres, M-A. 1995. Gender and Prehistoric Technology: On the Social Agency of Technical Strategies. World Archaeology 27(1):25-49.

Dobres, M-A. 2000. Technology and Social Agency. Oxford: Blackwell.

Drucker, D., & H. Bocherens. 2004. Carbon and Nitrogen Stable Isotopes as Tracers of Change in Diet Breadth During Middle and Upper Palaeolithic in Europe. International Journal of Osteoarchaeology 14:162-177.

Dunbar, R. 1996. Grooming, Gossip and the Evolution of Language. London: Faber and Faber.

Forster, P. 2004. Ice Ages and the Mitochondrial DNA Chronology of Human Dispersals: a Review. Philosophical transactions of the Royal Society of London B 359:255-264.

Fox, D. 1983. Personal Theories of Teaching. Studies in Higher Education 8(2):151-163.

Fritz, J. M., & F. Plog. 1970. The Nature of Archaeological Explanation. American Antiquity 35:405-412.

Gamble, C. S. 1986. The Palaeolithic Settlement of Europe. Cambridge: Cambridge University Press.

Gamble, C. 1993. Timewalkers: the Prehistory of Global Colonisation. Stroud: Alan Sutton.

Gamble, C. 1999. The Palaeolithic Societies of Europe. Cambridge: Cambridge University Press.

Goody, J., & I. Watt. 1972 (1963). The Consequences of Literacy. In, P. Giglioli (ed.), language and Social Context. London: Penguin Books.

Gordon, B. 1988. Of Men and Reindeer Herds in French Magdalenian Prehistory. Oxford: British Archaeological Reports International Series 390.

Gowlett, J. 1992. Ascent to civilization : the archaeology of early humans. 2nd ed. New York: McGraw-Hill.

Grayson, D. R. 1989. Bone Transport, Bone Destruction and Resource Utility Areas. Journal of Archaeological Science 16:643-652.

Grayson, D. R., & F. Delpeche. 1998. Changing Diet Breadth in the Early Upper Palaeolithic of Southwestern France. Journal of Archaeological Science 25:1119-1129.

Hallden, O. 1986. Learning History. Oxford Review of Education 12(1):53-66.

Harland, T. 2003. Vygotsky's Zone of Proximal Development and Problem-based Learning: Linking a Theoretical Concept with Practice through Action Research. Teaching in Higher Education. 8:263-272.

Heikkila, A., & K. Lonka. 2006. Studying in higher education: students' approaches to learning, self-regulation, and cognitive strategies. Studies in Higher Education 31(1):99-117.

Huntley, B., & J. Allen. 2003. Glacial Environments III: Palaeo-vegetation patterns in Late Glacial Europe. In T. van Andel & W. Davies (eds), Neanderthals and modern humans in Europe during the last glaciation. Cambridge: McDonald Institute Monographs.

Klein, R. G. 1999. The Human Career: Human Biological and Cultural Origins. Second Edition ed. Chicago: University of Chicago Press.

Kornblith, G., & C. Lasser. 2001. Teaching the American History Survey at the Opening of the Twenty-First Century: a round table discussion. The Journal of American History 87(4):1409- 1441.

Krings, K., A. Stone, R. W. Schmitz, H. Kraimatzki, M. Stoneking & S. Paaba. 1997. Neanderthal DNA Sequences and the Origins of Modern Humans. Cell (90).

Kuhn, T. S. 1970. The Structure of Scientific Revolutions. Chicago: University of Chicago Press.

Lave, J. & E. Wenger. 1991. Situated Learning: Legitimate Peripheral Participation. Cambridge:

Cambridge University Press.

Lowe, J. J., & M. Walker. 1997. Reconstructing Quaternary Environments. 2nd edition. ed. Vol. Addison-Wesley. London.

Meyer, J. & R. Land. 2003. Threshold Concepts and Troublesome Knowledge: linkages to ways of thinking and practising within the disciplines. In C. Rust (ed.), Improving Student Learning and Practice - Ten Years On. Oxford, Oxford Centre for Staff and Learning Development.

Mayyer, J. & R. Land. 2005. Threshold Concepts and Troublesome Knowledge (2): epistemological considerations and a conceptual framework for teaching and learning. Higher Education 49:373-388.

Mithen, S. J. 1990. Thoughtful foragers : a study of prehistoric decision making, New studies in archaeology. Cambridge: Cambridge University Press.

Mithen, S. J. 1996. The Prehistory of the Mind: A Search for the Origins of Art, Religion and Science. London: Thames and Hudson.

Moore, J. & A. Keene. 1983. Archaeological Hammers and Theories. New York, Academic Press.

Otte, M. (ed.). 1999. La Prehistoire. Paris: De Boeck Universite.

Pereira, L., M. Richards, A. Golos, A. Alonso, C. Albarran, O. Garcia, D. M. B. Mukaddes Golge, J. Hatina, L. Al-Gazali, D. G. Bradley, V. Macauley & A. Amorim. 2005. High- resolution mtDNA Evidence for the Late-Glacial Resettlement of Europe from an Iberian Refugium. Genome research 15:19-24.

Pettitt, P. B., W. Davies, C. S. Gamble & M. P Richards. 2003. Palaeolithic Radiocarbon Chronology: Quantifying our Confidence Beyond two Half-Lives. Journal of Archaeological Science 30:1685-1693.

Pigeot, N. 1987. Magdaleniens d'Etiolles: Economie et Debitage et Organisation Sociale (L'Unite d'Habitation U5). Gallia Prehistoire Supplement XXV (Supplement XXV).

Pigeot, N. 2004. Les Derniers Magdaleniens d'Etiolles: Perspectives Culturelles et Paleohistoriques (L'Unite d'Habitation Q31). Gallia Prehistoire Supplement XXXVII.

Piggott, S. 1958. The Dawn: and an Epilogue. Antiquity 32:75-79.

Pike-Tay, A. 1991. Red Deer Hunting in the Upper Palaeolithic of South West France. Oxford: British Archaeological Reports International Series 569.

Ramsden, P. 2003. Learning to Teach in Higher Education. London: Routledge Farmer.

Richards, M. P., P. Pettitt, M, C, Stiner & E. Trinkaus. 2001. Evidence for Increasing Dietary Breadth in the European mid-Upper Palaeolithic. Proceedings of the National Academy of Sciences 98(11):6528-6532.

Scarre, C. (ed). 2005. The Human Past. London: Thames and Hudson.

Schlanger, N. 2004. Suivre les gestes, eclat par eclat: la chaine operatoire de Leroi-Gourhan. In Autour de l'Homme: Contexte et Actualitie de Leroi-Gourhan, edited by F. Audouze and N. Schlanger. Paris: Editions APDCA.

Sinclair, A. G. M. 1998. Footnotes to Plato? Palaeolithic Archaeology and Innocence Lost. Antiquity 72(3):686-690.

Sinclair, A.G.M. 2000. Constellations of Knowledge: Human Agency and Material Affordance in Lithic Technology. In, M.-A. Dobres & J. E. Robb (eds) Agency in Archaeology. London: Routledge.

Soffer, O. (ed.). 1987. The Pleistocene Old World: Regional Perspectives, Interdisciplinary

Contributions to Archaeology. New York: Plenum Press.

Soffer, O. & C. S Gamble (eds). 1989. The World at 18,000 BP: High Lattitudes. London: Unwin Hyman.

Soffer, O. & N. D. Praslov (eds). 1993. From Kostenki to Clovis: Upper Palaeolithic - Paleo- Indian Adaptations. New York: Plenum Press.

Straus, L. G. 1992. Iberia before the Iberians: the Stone Age Prehistory of Cantabrian Spain. Albuquerque: University of New Mexico Press.

Straus, L. G. 2005. The Upper Palaeolithic of Cantabrian Spain. Evolutionary Anthropology 14:145-158.

Straus, L. G., M. G. Morales, M. A. F. Martinez & M. Paz Garcia-Gelabert. 2002. Last Glacial Human Settlement in Eastern Cantabria (Northern Spain). Journal of Archaeological Science 29:1403-1414.

Svoboda, J., V. Lozek, and E. Vlcek (eds). 1996. Hunters Between east and West: The Palaeolithic of Moravia. New York: Plenum Press.

Thomas, J. 1991. Rethinking the Neolithic. Cambridge: Cambridge University Press.

Trinkaus, E. 1995. Neanderthal Mortality Patterns. Journal of Archaeological Science 22:121- 142.

Trinkaus, E. 2005. Early Modern Humans. Annual Review of Anthropology 34:207-30.

van Andel, T. 2003. Glacial Environments I: the Weichselian Climate in Europe between the End of the OIS-5 Interglacial and the Last Glacial Maximum. In, T. van Andel & W. Davies (eds), Neanderthals and modern humans in Europe during the last glaciation. Cambridge: McDonald Institute Monographs.

Wenger, E. 1998. Communities of Practice: learning, meaning and Identity. Cambridge, Cambridge University Press.

White, R. H. 2003. Prehistoric Art: the Symbolic Journey of Humankind. New York: Harry N. Abrams.